DOCUMENT RESUME

ED 436 375 SE 062 334

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TITLE The Creative Mathematics Teacher.
PUB DATE 2000-00-00
NOTE 8p.
PUB TYPE Opinion Papers (120)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Creative Activities; Elementary Secondary Education; *Mathematics Instruction; *Mathematics Teachers; *Teacher Characteristics; Teaching Methods

ABSTRACT

The creative mathematics teacher who has love and enthusiasm for mathematics as a curriculum area should be in great demand in all schools. This paper discusses the characteristics of creative mathematics teachers, including those who guide students to engage in divergent thinking; have learners do much creative writing; and integrate creative dramatics, art, and the history of mathematics into their mathematics instruction. It is concluded that the creative teacher encourages students to be authentic individuals who are interested in the originality, novelty, and uniqueness of ideas. (ASK)

Dr. Marlow Ediger

THE CREATIVE MATHEMATICS TEACHER

The creative mathematics teacher should be greatly in demand in all schools. Ideas for teaching come from within the creative teacher, rather than from without. Confidence in the self is in evidence when the creative teacher chooses objectives, learning opportunities, an appraisal procedures. Leaning upon the self, trusting in personal skills and abilities, and possessing mathematics knowledge provide the inner being with a repertoire of attitudes and responses to teach, guide, and assist. A spirit of optimism helps the creative mathematics teacher to realize that all students can achieve in an optimal manner. What is within the teacher provides motivation and drive to teach well. That which is within is good, not evil.The goodness must be brought forth to the surface in creative teaching-learning situations (Ediger, 1997, Chapter One).

The creative mathematics teacher has a love and enthusiasm for mathematics, as a curriculum area. Through education, he/she has brought forth the needed knowledge,abilities,and attitudes to be a creative teacher of mathematics. Inside of human development tendencies, creativity is there and needs nourishing, not controlling nor conforming to the will of others. Creativity then is and exists in and of itself to come forth in natural development and growth. Human beings in society may wish to extinguish creative sparks, but, this is a wrongful act. Those who encourage creative ideas, thoughts, values,and substance are to be praised and rewarded, not punished nor penalized (Ediger, 1998, 1-6).

Divergent Thinking

The mathematics teacher should guide students to engage in divergent thinking. Thus, students can be guided to brainstorm possible solutions

to problems. Generating answers to problems is important. Diversity of responses is wanted, not conformity behavior.The teacher is a leader and encourages students to develop a variety of responses to problems posed. The creative mathematics teacher then desires students to come up with new ideas, not rote learning. Value judgments are not made as each idea is presented.

Problems may be either abstract or reality based. If abstract, the problems may be simulated. They may also be problems developed by learners based on models provided by the teacher. Problems that are reality based come from the real world of experience of individual students. Problems present dilemma situations. Gaps exist in that solutions are needed. The needed solutions then provide opportunities for students to engage in creative thought. Each solution can be tested as to its feasibility (Edlger, 1996,155-159).

Closely related to brainstorming is a problem solving procedure involving flexible, open ended steps.The first step is to select a problem. The problem needs to be clearly stated and may relate directly to the real world in the societal arena. Next, data from a variety of reference sources must be gathered in answer to the problematic situation. A hypothesis is developed, tentative in nature, to solve the mathematical problem. The hypothesis is subject to testing in a lifelike situation.Revisions are made of the hypothesis, as needed.

Problem solving contains a little more structure as compared to brainstorming. Both stress higher levels of thought or cognition. Problem solving emphasizes testing hypotheses in realistic settings. Brainstorming may stress more of generating possible answers to questions. There may be minimal testing of ideas presented in concrete and real situations. The best ideas are evaluated and used.
No possibility is labeled right or wrong in brainstorming process. Problem solving advocates have more direct possible answers to problems through data gathering and hypothesizing. The creative mathematics teacher should stress both brainstorming and problem solving as unique approaches in teaching to guide students to think in a

divergent, creative manner (Ediger, 1996,7-14).

Creative Writing in Mathematics

The mathematics teacher has learners do much creative writing. A writing across the curriculum philosophy should be emphasized. Writing cuts across all curriculum areas. The inter-disciplinary curriculum is then in evidence. Educational psychologists have long recommended that students should perceive knowledge as being integrated, rather than as isolated entities.

How can creative writing be emphasized in mathematics? Learners need to have ample opportunities to write word or story problems based on content being studied in an ongoing lesson or unit of study. Students are then making use of what has been learned. Creative writing is in evidence when students write novel word or story problems. Each student will write content that differs from other learners in the classroom. The facts, concepts, and generalizations acquired in ongoing lessons and units become subject matter for creative writing experiences. Uniqueness of ideas is wanted as students develop creative story and word problems (Ediger, 1989, 20-23.).

Creative Dramatics and Mathematics

Drama can very well be incorporated into a dynamic mathematics curriculum. Thus within a word problem, students may role play content studied. Students may plan with mathematics teacher guidance who will have each part in the presentation. Materials such as coins, sticks, plates, and plastic utensils may be used, depending upon what is called for in the word problem. The functions of each participant need to be discussed and implemented. Learners in the ongoing dramatic experience appraise what must be done to solve the problem.

The mathematics teacher serves as a helper and resource person, not a person who quickly tells students how to arrive at a solution. A major goal here is to guide students to come up with novel means of presenting subject matter emphasizing creative dramatics (Ediger, 1995, 1-11)..

Art in Mathematics

Art projects can fascinate students. A student teacher supervised by the writer had her pupils engage in geometry art. The student teacher prepared different geometric shapes, such as circles, squares, rectangles, triangles, trapezoids, and parallelograms from diverse colors of construction paper for primary grade learners. Pupils were to take the cut-outs to make persons, animals, and buildings, among other items. Highly original ideas in art products was an end result.The designs were pasted on light colored construction paper and displayed on the hallway walls next the classroom. Other learners observed the display and encouraged their teachers to emphasize a similar activity.

Students do come up with unique ideas if creative expression is encouraged. The student teacher developed a classroom climate that encouraged spontaneity and novelty.

History of Mathematics

Students can certainly be guided to enjoy a unit on the historical facets of mathematics. A hands on approach can be used in teaching related facts, concepts, and generalizations in history. Another student teacher supervised by the writer assisted her class of learners to construct a movie set on the Egyptian system of numeration. A cardboard box,18 inches long and 6 inches deep, with a height of 12 inches was used.The front of the box was cut out and used as the screen for the monitor on the TV set. Two dowel rods were inserted, five inches apart, running lengthwise through the movie set. A roll of paper was used to portray scenes of the Egyptian system of numeration. For the first scene, tally

marks were shown to indicate units or ones. Each tally mark had a value of one; as many as nine tally marks can be used to show a value of nine.The next scene on the roll of paper has a scene of animal hoofs shaped like a U turned upside down. Again, as many as nine hoofs can be used to show a value, and in this case, nine hoofs would have a value of ninety in the Egyptian system of numeration. The third frame on the roll of paper would have a picture of an ancient scroll. Each scroll had a value of 100. Thus nine scrolls have a value of 900. The next symbol used was a lotus flower. One lotus flower would equal 1000, whereas nine lotus flowers would equal 9000.The lotus flower was very common in ancient Egypt and grew freely along the Nile river. The fifth frame on the roll of paper is a bent reed. Each bent reed had a value of 10,000. The sixth frame on the movie set was a pictured fish. Each fish had a value of 100,000. The last Egyptian numeration symbol is an astonished man. Each astonished man equals 1,000,000. The greatest number of astonished men that could be shown would be nine, having a value of 9,000,000.

A committee of three pupils worked on each frame on the roll of butcher paper to draw their respective symbols such as putting the tally marks in accurately and neatly. When the entire movie set was completed by the different committees of pupils, each committee told about the history and reasons for the different symbols used by the ancient Egyptians, as the diverse scenes were shown on the movie set (See Ediger, 1999, 146-147).

Additional Creative Experiences for Students

There are many other activities in mathematics emphasizing creativity which students can experience.These include;

1. writing poetry containing both rhymed (couplets, triplets, quatrains, and limericks), and unrhymed (haiku, tanka, diamantes, and free verse) poems.
2. developing prose emphasizing tall tales, legends, myths, fairy tales,

and other forms of folklore.

3. making models of instructional materials to use in the teaching of mathematics.

4. putting words to music in terms of major concepts learned in ongoing units of study in mathematics.

In Closing

There are numerous learning opportunities that may be emphasized in a creative mathematics curriculum.These include

1.divergent thinking experiences.
2.creative writing.
3.dramatic activities.
4.art endeavors,
5.construction work.
6.poetry and prose written by students.
7.composing music.
8.making of models.

The creative teacher encourages students to be authentic individuals who are interested in originality, novelty, and uniqueness of ideas.

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